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IS 11681 (1986): Technico-commercial definitions of horological vocabulary [PGD 23: Horology]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

(Reaffirmed - 2012)



TECHNICO-COMMERCIAL DEFINITIONS OF HOROLOGICAL VOCABULARY

(ISO Title : Horological Vocabulary — Part 2 : Technico-
Commercial Definitions)

National Foreword

This Indian Standard, which is identical with ISO 6426/2-1984 'Horological vocabulary — Part 2 : Technico-commercial definitions', issued by the International Organization for Standardization (ISO); was adopted by the Indian Standards Institution on the recommendation of the Horology Sectional Committee and approval of the Mechanical Engineering Division Council.

In the adopted standard certain terminology and conventions are not identical with those used in Indian Standards; attention is specially drawn to the following:

Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use point (.) as the decimal marker.

Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'Indian Standard'.

Cross References

International Standard

Corresponding Indian Standard

ISO 764-1984

IS : 9243 (Part 1) Methods for test for wrist
watches: Part 1 Anti-magnetic
(Technically equivalent)

ISO 1112-1974

IS : 9263 (Part 1)-1979 Specification for horological
jewels: Part 1 Functional and non-functional jewels
(definition)
(Technically equivalent)

ISO 2281-1984

IS : 9243 (Part 3) Methods of test for wrist
watches: Part 3 Water resistant (*first revision*)
(Technically equivalent)

There is no Indian Standard corresponding to ISO 3159-1976 to which reference is made under the clause on references.

This standard is the national implementation of ISO 6426/2-1984, as such only the English text has been reproduced. If the French text is required, reference should be made to the original ISO publication.

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Introduction

This part of ISO 6426 gives technico-commercial definitions, part 1 giving technico-scientific definitions mainly relating to the rate of a time measuring instrument.

The definitions given in this part of ISO 6426, intended more particularly for the general public, have been simplified especially with regard to clause 3 concerning the rate of a time measuring instrument.

Where there is ambiguity, it is advisable to refer to the definitions of the corresponding terms in part 1 which are in more detail.

Some common terms, the definitions of which do not give rise to any confusion and which occur in other specialized documents, have not been included in this part of ISO 6426.

Scope and field of application

This part of ISO 6426 defines the principal technico-commercial terms used in the horological industry.

The definitions apply to time measuring instruments and related devices.

References

ISO 764, *Horology — Antimagnetic watches.*

ISO 1112, *Horology — Functional and non-functional jewels.*

ISO 2281, *Horology — Water-resistant watches.*

ISO 3159, *Time keeping instruments — Wrist-chronometers with spring balance oscillator.*

Terms and definitions

1 General terms

1.1 time : Undefined medium in which existing objects appear to develop irreversibly in the changes which they undergo, and in which events and phenomena appear to occur in their succession.

To this medium corresponds a quantity, t , allowing, in a time scale, the chronological filing of events.

1.2 date : Notation of an instant in a time scale.

In current use, this term stands for the indication of the year, month, day and day of the month.

1.3 duration : Time which elapses between two determined dates.

1.4 period : Duration characterized by a repetitive phenomenon.

1.5 frequency : Number of periods per second.

This value is expressed in hertz (Hz) (examples : 32,768 kHz = 32 768 Hz, 8 MHz = 8 000 000 Hz). For pendulum and spring balance oscillators, the number of alternations per hour can be given (example : 2,5 Hz = 18 000 alternations per hour).

1.6 alternation : Displacement of an oscillating body between two extreme positions. This concept also applies to the representation of any periodic phenomenon.

The beating frequency of a balance wheel is currently given in 'alternations per hour'. For an oscillator of 2,5 Hz (beating every fifth of a second), five alternations per second correspond to 18 000 alternations per hour.

1.7 oscillation : Complete cycle of a periodic phenomenon (twice an alternation).

1.8 amplitude : Value of the displacement, angular or linear, between the rest position and an extreme position of an oscillating part. This concept also applies to the representation of any periodic phenomenon.

1.9 isochronism : Aptitude possessed by a phenomenon to reproduce itself in equal periods of time whatever the external influences; for example the period of an oscillation being independent of its amplitude.

1.10 thermal compensation : Device intended to compensate the effect of temperature variation on the chronometric characteristics of a time measuring instrument.

1.11 automatic : Functioning by itself.

Term used for mechanical time measuring instruments which operate without the need for manual re-winding. Also used as a noun : an automatic (for an automatic watch).

1.12 movement fitting (dimensions) : Lateral dimensions of the plate serving as a reference for the assembly with the case of the time measuring instrument. On traditional ebauches, they are generally smaller than the largest dimension of the movement.

1.13 ligne (or line) : An old unit of length (2,256 mm) used commercially to designate approximately the dimension of a movement.

1.14 regulation : Operation permitting improvement of the accuracy of a time measuring instrument.

1.15 consumption : In time measuring instruments, it is generally expressed by the electrical current required in normal use.

For watches, it is expressed in microamperes.

1.16 power reserve : Duration which a time measuring instrument can operate on its own power reserves without further external power.

1.17 autonomy : Ability of a time measuring instrument to function on its own reserves, with any external energy supplied to it by its normal environment but independently of any conscious intervention on the part of the user.

This term is also used to designate the duration for which this ability is maintained.

For an electronic watch, autonomy means the time interval between two battery changes.

1.18 water resistance : Ability of a time measuring instrument to resist water penetration; for watches, as specified by ISO 2281.

1.19 anti-magnetism : Ability of a time measuring instrument to withstand a magnetic field under conditions specified by ISO 764.

2 Time measuring instruments

The definitions in this clause relate, on the one hand, to different products or designations resulting from their main function and, on the other, to particular characteristics associated with the nature of certain constituent parts or a recognized name.

2.1 time measuring instrument : Instrument indicating the time of day or measuring duration, separately or simultaneously.

2.2 time keeping instrument : Time measuring instrument, indicating the time of day.

2.3 time counter : Time measuring instrument, measuring durations. It does not indicate the time of day (see 2.9).

2.4 programmable time counter : Time measuring instrument fitted with one or more devices permitting control of operations at predetermined intervals of time.

2.5 programmable time keeping instrument : Programmable time counter which incorporates the functions of a time keeping instrument.

2.6 watch : Time keeping instrument designed to be worn and to function in all positions.

2.7 chronometer : Official name given to a precision time keeping instrument regulated for various conditions of use (for example : ISO 3159 for mechanical wrist-chronometers).

Conformity with the definition of chronometer is approved by an impartial official body which carries out the inspection on the time keeping instrument or, if necessary, on the movement, and grants an individual official attestation (rating certificate).

2.8 chronograph : Time keeping instrument comprising a time counter allowing measurement and display of time intervals independently of keeping and, possibly, indicating the time of day. It can also incorporate a recording device.

2.9 stop watch : A portable time counter.

2.10 : A watch allowing measurement of durations. When this measurement is carried out, there may be partial or total loss of display of the time of day until a reset occurs.

2.11 clock : Time keeping instrument designed to operate in a fixed position.

2.12 mechanical time keeping instrument : Time keeping instrument of which the following main components are exclusively mechanical : driving energy, oscillating device and its maintenance time display.

2.13 electric (or electro-mechanical) time keeping instrument : Time keeping instrument having a source of electrical energy and a system for electro-mechanical maintenance of the oscillating device (having a mechanical contactor, that is, complete absence of any electronic control of the oscillating device).

2.14 electronic time keeping instrument¹⁾ : Time keeping instrument having a source of electrical energy, and essentially an oscillating device maintained by electronic control.

2.15 solid state time keeping instrument¹⁾ : Electronic time keeping instrument having no functional mechanical component not even in its display. However, adjusting systems such as display control, re-setting, etc., may be mechanical.

2.16 spring balance time keeping instrument : Time keeping instrument whose time base comprises a spring balance oscillating device.

2.17 quartz time keeping instrument¹⁾ : Time keeping instrument whose time base comprises a quartz oscillating device.

2.18 tuning fork time keeping instrument¹⁾ : Time keeping instrument whose time base comprises a metal tuning fork oscillating device maintained electromagnetically.

3 Rate of a time measuring instrument

3.1 state : The difference, at a precise instant between the time of day indicated by a time keeping instrument and the reference time.

The state is positive or negative according to whether the time keeping instrument is running fast or slow in comparison with the reference time.

3.2 rate : Expression of the difference, per unit of time, between two states of a time keeping instrument, separated by a given interval of time (duration).

If it is positive, the instrument is fast and vice versa.

3.3 daily rate : Expression of the difference between two states separated by a time interval of 24 h (example : ± 1 s per day).

3.4 monthly rate : Expression of the difference between two states separated by a time interval of one month (example : ± 20 s per month).

3.5 annual rate : Expression of the difference between two states separated by a time interval of one year (example : ± 2 min per year).

1) As regards the marking of time keeping instruments and commercial advertising, the use of expressions "quartz", "tuning fork", "electronic", "solid state", etc. shall exactly comply with the corresponding definitions.

3.6 instantaneous rate : Expression of the difference between two states separated by a very short interval of time.

It is generally expressed in seconds per day because in practice extrapolation makes it correspond to the probable daily rate.

3.7 probable rate : Formulation of the value of the rate which a time measuring instrument would probably have if it were placed or used in specified conditions similar to the conditions of use for which the instrument is intended.

It may be related, for example, to a duration of :

- 24 h (probable daily rate);
- one month (probable monthly rate);
- one year (probable annual rate).

3.8 variation of daily rate : Difference between two daily rates separated by a specified time interval.

Generally, two consecutive daily rates are considered, in which case this variation is the daily variation of daily rate.

3.9 deviation : Progressive and/or natural change in the rate as a function of time.

If the rate of an instrument increases, the deviation is positive and vice versa.

3.10 drift : Mean value of the deviation during a specified interval of time.

3.11 chronometric stability : Ability of a time measuring instrument to maintain its rate within certain fixed limits.

4 Essential devices and parts

Terms relating to essential devices and parts are classified under the following headings :

- power supply;
- time base;
- display;
- casing.

4.1 power supply device : Device supplying the energy necessary for the operation of a time measuring instrument.

The energy may be mechanical, electrical, luminous, thermal or other.

4.2 time base : Device having the function of determining equal intervals of time.

4.2.1 resonator : Oscillating device with a sufficiently stable period to permit its use as a time base in time measuring instruments.

For example :

- mass-gravity : pendulum, etc.;
- inertia-elasticity : spring balance system, vibrating blade, tuning fork, flexural mode quartz, lenticular quartz, lithium tantalate, etc.;
- atomic or molecular resonator : caesium, maser, etc.
- optical : laser, etc.

Associated with a maintaining part, a resonator constitutes an oscillator.

4.2.2 oscillator : Device (comprising or not a resonator) supplying a sufficiently stable frequency (or period).

4.3 display : Indicating device with mechanical, electrical or electronic control.

The display may, for example, be effected by hands, light emitting diodes (abbreviated to LED) or a liquid crystal display (abbreviated to LCD).

Special devices permit display which can be read by touch. In certain cases, the display may be replaced by sound information.

4.3.1 analogue display : Display indicating time by relative displacement of a marker and scale (generally, hands and dial).

4.3.2 digital, alpha-numerical or symbolic display : Display indicating time in a digital form (figures) or an **alpha-numerical** (letters and figures) or **symbolic** form.

NOTE — The different types of display may be combined.

4.3.3 active display : Display which radiates light.

4.3.4 passive display : Display requiring external light.

4.3.5 digit : Segment or group of segments or dots which, when combined, permit the display of the numbers zero to nine. By extension, this concept is also applied to the display of letters.

4.3.6 display device : A component permitting display of indications by means of symbols, figures or letters.

4.4 casing : All parts added to the movement and contributing to its external presentation, protection, fixing, control... (case, dial, hands, etc.).

4.4.1 case : Protective element in which the horological movement is mounted.

Term used as an abbreviation for "watch case".

4.4.2 push button : Button which is pressed to release an action or make an electrical contact.

Certain buttons mainly intended for correction are called correctors

4.4.3 hatch : Removable part of the case facilitating access to an internal part of the watch (generally the battery).

4.4.4 dial : Part generally bearing divisions of one or more sizes, over which one or more hands move, indicating by their position the value of the quantity in question, for example :

- time (hours, minutes, seconds, intervals of time, etc.);
- temperature, atmospheric pressure, humidity, etc.

By extension, in the case of watches with numerical display, this term signifies an element of the casing sometimes bearing indications or reference marks.

4.4.5 crown : When applying to the casing, a milled or fluted knob of unspecified shape allowing manual control of winding, re-setting or other functions.

5 Functions, indications and additional devices

Commercially, functions shall be distinguished from indications and additional devices, and counted separately in accordance with the table below.

NOTE — This table may be supplemented later according to technological development.

Table — Functions, indications and additional devices

Function and commercial designation	Indications	Additional devices
Display of time of day	Hour, minute, second, fraction of second	Operating indicator (for example, flashing seconds indicator) Seconds zero reset Fast seconds corrector Seconds indication automatic correction Acoustic information Repetition of acoustic information
Calendar	Day of the month, day, month, year, phases of the moon, tides	Programmed calendar excluding February 29 Programmed calendar including February 29
Display of other time zones	Time of day (one indication) Calendar (one indication)	Global time
Time interval measurement (chronograph)	Hour, minute, second, fraction of second	Split time counter Lap time counter Retaining and reading other indications Timer (count down device)
Alarm	Programmable alarm signal start time	Alarm set indicator Alarm signal check Alarm intensity control Alarm signal repeater
Calculator		
Physiological quantities measurement	Body temperature, pulse rate, blood pressure	
		Additional devices common to several functions Acoustic signal Display lighting End of battery life indication External rate adjustment Indication of displayed functions Stop

5.1 Display of time of day function

5.1.1 Indications

These four indications, used separately or together, may only be considered as a single function :

- hour [24 or 12 h; with or without mention of a.m. (*ante meridiem*) = morning, and p.m. (*post meridiem*) = afternoon];
- minute;
- second;
- fraction of second.

5.1.2 Additional devices

5.1.2.1 operating indicator : Visual device permitting inspection of the operation of the movement, for example : a flashing seconds point.

5.1.2.2 seconds zero reset : Setting device comprising setting the indication of the seconds to zero. It makes it possible to adjust the instrument in perfect synchronization with a time signal.

5.1.2.3 fast seconds corrector : Device which permits rapid forward or backward correction by synchronizing the indication of the seconds with a time signal

5.1.2.4 seconds indication automatic correction : System which regularly compares the state of the electronic reference counter and the position of the seconds hand. If the position of the seconds hand is disturbed (shock, magnetic field), the difference is measured and immediately corrected.

5.1.2.5 acoustic information : Device giving time of day information acoustically.

5.1.2.6 repetition of acoustic information : Device giving an acoustic repetition of time of day information.

5.2 Calendar function

5.2.1 Indications

These six indications, used separately or together, may only be considered as a single function :

- day of the month;
- day;
- month;
- year;
- phases of the moon;
- tides.

5.2.2 Additional devices

5.2.2.1 programmed calendar excluding 29 February : Device with memory effecting change of date at the end of each month, except for the 29 February in leap years.

5.2.2.2 programmed calendar including 29 February : Device with memory effecting change of date at the end of each month, with allowance for 29 February in leap years.

5.3 Display of other time zones function

Function permitting display of the time of day, and sometimes the calendar, of one or more additional time zones.

5.3.1 Indications

These two indications, used separately or together, may only be considered as a single function :

- hour, minute, second, fraction of second (one indication for one or more time zones);
- calendar (one indication for one or more time zones).

5.3.2 Additional device

5.3.2.1 global time : Device permitting display of the time of day in time zones of several selected locations.

5.4 Chronograph function

5.4.1 Indications

These four indications, used separately or together, may only be considered as a single function, in which the addition of time is included :

- hour;
- minute;
- second;
- fraction of second.

5.4.2 Additional devices

5.4.2.1 split time counter : Device permitting display of several successive times measured from the same origin, it being possible to make up for the reading time without disturbing the measurement

5.4.2.2 lap time counter : Device, with instantaneous zero reset, permitting display of several successive times, having as their origin the precise instant at which the preceding time ends.

5.4.2.3 retaining and reading of other indications : Device permitting reading of all or part of the indications without disturbing the measurement of time intervals.

5.4.2.4 timer (count down device) : Device permitting count down of a pre-determined interval of time.

5.5 Alarm function

5.5.1 Indications

Programmable alarm signal start time (hour and minute at least).

5.5.2 Additional devices

5.5.2.1 alarm set indicator : Device permitting verification that the alarm function is engaged.

5.5.2.2 alarm signal check : Device permitting checking of the alarm signal.

5.5.2.3 alarm intensity control : Device permitting modification of the intensity of the alarm signal.

5.5.2.4 alarm signal repeater : Device effecting the repetition of the alarm signal.

5.6 Calculator function

This function is only considered as a single function whatever the indications of the calculator.

5.7 Physiological quantities measurement function

5.7.1 Indications

These three indications, used separately or together, may only be considered as a single function :

- body temperature;
- pulse rate;
- blood pressure.

5.8 Additional devices common to several functions

5.8.1 Acoustic signal (for other than normal alarm or time information purposes); for example, for the end of count down.

5.8.2 Display lighting (electrical, radioluminescent, etc.).

5.8.3 indication of end of battery life : A device indicating, for example, by the seconds hand advancing every 2 s or by flashing of the display, that the battery is running down.

5.8.4 External rate adjustment.

5.8.5 Indication of displayed functions.

5.8.6 Stop.

6 Components and miscellaneous

NOTE — The detailed list of time measuring instrument components is given in the ISO 3831.

6.1 accumulator : Device which, by chemical means, stores up the electric energy supplied to it and then releases that energy as required.

6.2 shock absorber : Device protecting certain fragile parts, for example the pivot of certain staves (generally the balance staff) against mechanical shock.

6.3 pallet assembly : A part of a mechanical time measuring instrument which transmits driving force by alternate displacements.

NOTE — In mechanical watches in which the pallet assembly transmits the driving force to the balance, the following terms are used : "jewelled lever escapement" or "lever escapement" watch for a watch in which the escapement is of the shared impulse type and "pin pallet" watch for one in which the escapement is of the wheel impulse type.

6.4 assortment : Set of parts common to a given function.

The word may be used as an abbreviation to designate the essential parts required for the escapement function.

6.5 self-compensating : That which compensates by itself.

Employed for example, to describe certain metal alloys used for hair springs, where the elasticity varies little with temperature. This allows better adjustment of the time measuring instrument.

6.6 magnetic screen : Component or coating used to protect part of, or a complete movement from external magnetic fields.

6.7 calendar : Device for displaying day of the month, day, month, etc. consecutively or simultaneously.

6.8 calibre : Size, shape and identity of a horological movement. These characteristics are usually given in the form of figures and letters.

6.9 solar cell : Device transforming light (normally sun) energy into electrical energy.

6.10 chablon : Whole set of components of a horological movement, either with or without dial and hands and either non or partially assembled. The set is marketed as such.

6.11 pin : Peg fixed to a component. It may, for example, allow couple to be sent and received, notably as in a pin pallet watch or as on a balance roller.

6.12 printed circuit : Conducting metal deposit fixed to an insulating support and used to hold and connect components.

6.13 integrated circuit : Set of inseparable electronic components intended to fulfil one or more functions.

This circuit is produced in a single manufacturing sequence, starting with a support generally of silicium. Integrated circuits for watches have a surface area of a few square millimetres.

6.14 hybrid circuit : Circuit obtained from the use of different technologies (for example, MOS and bipolar, thin film, thick film, etc.).

6.15 frequency corrector : Device allowing adjustment of the frequency of an oscillator (for example, a trimmer).

6.16 tuning fork : Part with two arms vibrating at a sufficiently stable frequency and used as a resonator in so called "tuning fork" time measuring instruments.

Quartz tuning forks are also used in certain quartz watches.

6.17 ebauche : Non-assembled parts of the components of a horological movement, marketed as such.

6.18 escapement : Device which transforms movement allowing energy transmission and the counting of oscillations.

6.19 module : Sub-assembly comprising several components capable of ensuring one or more special functions of a time measuring instrument.

6.20 movement : Device which produces and maintains a recurring phenomenon and is capable of counting time. It may comprise sub-assemblies.

6.21 stepping motor : Motor fed with electrical impulses and comprising at least one movable element which displaces in a stepwise fashion.

6.22 pallet : Part of a pallet assembly which receives impulses from the escape wheel. A pallet is called an "entrance" or "exit" pallet according to the position it occupies in the pallet assembly. (At present, pallets are most often made of ruby).

6.23 jewel : Generally, synthetic ruby used in horology.

The term "functional jewel" is only to be used to designate a natural or synthetic jewel which improves the frictional stability and diminishes wear on the contact surfaces (see ISO 1112).

6.24 battery : Source of electrical energy obtained by the direct conversion of chemical energy.

6.25 quartz : Crystallized silicon oxide having certain piezo electrical properties which enable it to be used as a resonator.

6.26 ruby : Crystallized aluminium oxide usually of a red colour.

Synthetic ruby is generally used in the manufacture of horological jewels.

6.27 substrate : Support of electronic or mechanical elements ensuring their electrical interconnection.

6.28 setting stem : Driving shaft allowing manual control of certain functions, in particular the setting of the displayed indications (time of day, date, etc.).

The setting stem is used in certain electrical or electronic time keeping instruments.

6.29 winding stem : Driving shaft allowing manual control of certain functions, in particular winding and the setting of the displayed indications (time of day, date, etc.).

The winding stem is used in most mechanical watches.

6.30 transducer (transformer) : Device which transforms one type of energy into another. It may be one of the following sorts :

- electro-magnetic or electro-dynamic (motor);
- opto-electrical (solar cell);
- electro-chemical (battery);
- etc.

6.31 trimmer : Variable capacitor allowing adjustment of the frequency of an oscillator.

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